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Three lichenized fungi new to Turkey and the Middle East

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Abstract –– Three species of lichenized fungi – *Arthonia calcarea, Buellia sequax,* and *Trapeliopsis gelatinosa* – are reported here as new to Turkey. *Buellia sequax* and *Trapeliopsis gelatinosa* are also new to the Middle East. Distribution and substrate data are presented.

Keywords –– Ardahan, *Ascomycetes*, biodiversity

Introduction

Studies on the lichen flora of Turkey are not as extensive as elsewhere. Recently, however, many new lichen and lichenicolous taxa have been recorded for Turkey (Aptroot & Yazici 2009, Candan & Özdemir Türk 2008, Etayo & Yazici 2009, Yazici & Aptroot 2008, Yazici et al. 2008a,b). No lichenized fungi have thus far been reported for Ardahan. The present paper contributes further information to our knowledge of the lichen flora of Turkey.

Materials and methods

The present report is based on specimens collected in the Ardahan region between 15–20 August 2008. Air-dried samples were observed and studied with a Nikon SMZ1500 stereomicroscope and a Nikon Eclipse 80i light microscope with standard identification methods for lichenized fungi (Bungartz et al. 2004, Dobson 2005, Purvis et al. 1992, Torrente & Egea 1989). Vouchers are stored in the herbarium of the Biology Department, Faculty of Sciences and Arts, Karadeniz Technical University, Trabzon, Turkey.

Species

Arthonia calcarea (Turner ex Sm.) Ertz & Diederich

Specimen examined: Ardahan, Posof, Kurşunçavuş village, near the creek, 41°31'37.76"N, 42°37'16.40"E, on calcareous rock, 1790 m, 15 August 2008, Yazici 2015.

Thallus crustose, saxicolous, often appearing farinose, white to pink-grey or endolithic, effigurate, usually more or less immersed in the substrate surface, the immersed hyphae with attached oil globules. Pseudotechium black lirellate or stellate (0.4–2.3 × 0.08–0.18 mm), innate, delicate, simple or frequently unbranched, star-shaped, slit-like or sometimes often form piled up in heaps, roughly leafy, to (2–)3 cm in diam., brown to dark-brown; disc a persistent slit with thick ± swollen margin. Hypothecium 10–30 µm high. Hymenium 80–100 µm tall. Ascospores ellipsoid (*calcarea*–type), 3–septate 14–20 × 4–6 µm. Conidia 5–8 × 0.8–1 µm. All spot tests negative.

Arthonia calcarea is a mediterranean lichen species, frequently found on inclined, shaded siliceous or calcareous and maritime sandstone rocks, but also on natural outcrops, walls, and man-made substrates in small urban areas.

Collection site —Microclimatic conditions with soft and rainy winters and hot summers rule in the study area. Mean annual temperature is 6.8° C. Mean annual rainfall is 600 mm. Generally the site is a well lit, more-or-less open and has a creek. Occasionally *Corylus*, *Populus*, *Salix*, *Carpinus,* and *Picea orientalis* are also seen there.

Known distribution: Europe (Belgium, Cyprus, England, Greece, Ireland, Norway, Slovenia, Spain, Switzerland, The Netherlands), Caucasus, North America. New to Turkey.

Remarks—*Arthonia calcarea,* which has long been referred to *Opegrapha,* has recently been combined in *Arthonia* (Ertz et al. 2009), where we recognize it. The species resembles *Arthonia atra* and *O. saxatilis,* but *A. calcarea* is saxicolous and endolithic while *A. atra* is corticolous. The thallus of *O. saxatilis* is white or light to dark-brown, rough and scurfy while *A. calcarea* is ± pink and immersed. In addition ± clavate spores in *O. saxatilis* help to differentiate from *A. calcarea* which has ellipsoid spores (Dobson 2005).

Buellia sequax (Nyl.) Zahlbr.

Specimen examined: Ardahan, Göle, Samandöken village, 40°51'23.06"N, 42°29'45.80"E, on siliceous rock, 2055 m, 20 August 2008, Yazici 2016.

Thallus crustose, thin and discontinuous, conspicuous, with poorly delimited granules or rimose to very rarely rimose-areolate, not delimited by a hypothallus; surface matt, pale-brown to greyish, smooth to slightly roughened, epruinose. Apothecia lecideine, adnate or sessile; margin soon excluded; disk black, plane, epruinose, soon convex; inner excipular hyphae, prosoplectenchymatous; hypothecium dull reddish-brown; pigmentation

concolorous with the epihymenium; hymenium hyaline, paraphyses simple to moderately branched, apically swollen, with a brown pigmented cap. Asci 8-spored, clavate, *Bacidia*-type. Ascospores 1-septate, distinctly narrowly oblong, becoming ellipsoid, with obtuse ends, not curved 10.7–12.7 × 3.8–5.4 µm, one septate; thin perispore (0.1–0.2 µm), narrow thick proper spore wall (0.3–0.5 µm). Pycnidia rare, conidia simple, bacilliform, 2.0–4.0 × 1.0–1.5 µm. All spot test negative, but very rarely K+ orange.

Buellia sequax grows on a large variety of silicous rocks from coastal up to subalpine localities.

Collection site – The climate is continental with hot dry summers and cold snowy winters. The mean annual rainfall is 500 mm and a mean annual temperature is 5°C, The site is well lit, open area, gently ±sloped terrain, sunny and covered with grass and rocks, and lies among agricultural areas and extensive plains.

Known distribution: Europe (Austria, England, Ireland, Italy, Spain, Switzerland, Greece: Kalimnos and parts of Kos İslands), Morocco, China: Hongkong, Mexico, North America, Pacific Island: Guadalupe, Venezuela. New to Turkey and the Middle East.

Remarks—It is difficult to separate *Buellia sequax* with well-developed thallus from *B. prospersa*. *Buellia sequax* has bacilliform conidia while *B. prospersa* has filiform. Young ascospores of *B. sequax* are typically narrowly oblong and not ornamented while *B. prospersa* typically have a thickened medium septum. Only overmature and often disintegrating ascospores of *B. sequax* show a week ornamentation whereas a microrugulate ornamentation usually develops in *B. prospersa.* Furthermore, *B. prospersa* is more or less chasmolithic instead of saxicolous.

Trapeliopsis gelatinosa (Flörke) Coppins & P. James

Specimen examined: Ardahan, Posof, Kurşunçavuş village, near the creek, 41°31'37.76"N, 42°37'16.40"E, on calcareous rock, 1790 m, 15 August 2008, Yazici 2020.

Thallus thin, minutely granular crust, and membranous, effuse, dark green-brown to green-grey, P–, K–, KC–, C–, with pale green soralia, at first 0.2–0.7 mm diam., but often becoming very conspicuous, irregular and confluent. The small soralia contrasting in colour with the darker thallus surface, occasionally no soralia are present. Photobiont trebouxioid. Apothecia 0.2–1(–1.6) mm diam., adpressed; exciple excluded or as a thin, pale rim not exceeding the level of the disc, dark green-grey to grey-black; epithecium green, K+ brown. Ascospores 8–14 × 4.5–6 µm.

Trapeliopsis gelatinosa grows mainly on shaded, damp, peaty banks, humus-rich soil, cuttings with overhanging herbs, or small shrubs, sometimes corticolous on *Tilia*; rather local, especially in upland districts.

Collection site – See *Arthonia calcarea* above for climatic conditions. In addition especially *Picea orientalis* is predominantly seen there.

Known distribution: Europe (Belgium, Czech Republic, Croatia, England, France, Germany, Ireland, Luxembourg, Norway, Scotland: Arran Island, Spain), Australia, Canada: Central Siberia, Michigan, North America. New to Turkey and the Middle East.

Remarks – *Trapeliopsis gelatinosa* resembles *T. aeneofusca,* but apothecia in *T. aeneofusca* are pale to reddish brown and the epithecium is ± colourless to reddish brown. In addition, the epithecium in *T. gelatinosa* is K+ brown, but in *T. aeneofusca* K–.

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